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From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:
CATHERINE J. WINTER
PATENT COUNSEL
GENERAL ELECTRIC COMPANY
3135 EASTON TURNPIKE (W3C)
FAIRFIELD, CONNECTICUT 06828

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GENERAL ELECTRIC CO.
WRITTEN OPINION
(PCT Rule 66)

Applicant's or agent's file reference		Date of Mailing (day/month/year)
1330.012WO1		04 OCT 2004
REPLY DUE		within 1 months/days from the above date of mailing
International application No.	International filing date (day/month/year)	Priority date (day/month/year)
PCT/US03/17527	04 June 2003 (04.06.2003)	04 June 2002 (04.06.2002)
International Patent Classification (IPC) or both national classification and IPC		
IPC(7): B01D 61/00, 63/00; C02F 1/44 and US Cl.: 210/652, 650, 321.76, 321.85; 96/4,6,8,10		
Applicant		
GE OSMONICS, INC		

- This written opinion is the first (first, etc.) drawn by this International Preliminary Examining Authority.
- This opinion contains indications relating to the following items:
 - ☒ Basis of the opinion
 - ☐ Priority
 - ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - ☒ Lack of unity of invention
 - ☒ Reasoned statement under Rule 66.2 (a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - ☐ Certain documents cited
 - ☐ Certain defects in the international application
 - ☐ Certain observations on the international application
- The applicant is hereby **invited to reply** to this opinion.

When? See the time limit indicated above. ~~The applicant may, before the expiration of that time limit, request this Authority to grant an extension. See rule 66.2(d).~~

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also For an additional opportunity to submit amendments, see Rule 66.4.
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 *bis*.
For an informal communication with the examiner, see Rule 66.6

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.
- The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 04 October 2004 (04.10.2004)

Name and mailing address of the IPEA/US Mail Stop PCT, Attn: IPEA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230	Authorized officer Krishnan S Menon Telephone No. 571-272-1700
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Jean Proctor
Paralegal Specialist

I. Basis of the opinion

1. With regard to the elements of the international application:*

- ☒ the international application as originally filed
- ☒ the description:
 pages 1-20, as originally filed
 pages NONE, filed with the demand
 pages NONE, filed with the letter of _____
- ☒ the claims:
 pages 21-29, as originally filed
 pages NONE, as amended (together with any statement) under Article 19
 pages NONE, filed with the demand
 pages NONE, filed with the letter of _____
- ☒ the drawings:
 pages 1-2, as originally filed
 pages NONE, filed with the demand
 pages NONE, filed with the letter of _____
- ☐ the sequence listing part of the description:
 pages NONE, as originally filed
 pages NONE, filed with the demand
 pages NONE, filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
 These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the written opinion was drawn on the basis of the sequence listing:

- ☐ contained in the international application in printed form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages NONE
- ☐ the claims, Nos. NONE
- ☐ the drawings, sheets/fig NONE

5. ☐ This opinion has been drawn as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed."

WRITTEN OPINION

International application No.

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IV. Lack of unity of invention

1. In response to the invitation (Form PCT/IPEA/405) to restrict or pay additional fees the applicant has:

- ☐ restricted the claims.
☒ paid additional fees.
☐ paid additional fees under protest.
☐ neither restricted nor paid additional fees.

2. This Authority found that the requirement of unity of invention is not complied with for the following reasons and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees:

3. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this opinion:

- ☒ all parts.
☐ the parts relating to claims Nos. ____.

WRITTEN OPINION

International application No.
PCT/US03/17527**V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. STATEMENT**

Novelty (N)	Claims <u>1-73</u>	YES
	Claims <u>NONE</u>	NO
Inventive Step (IS)	Claims <u>NONE</u>	YES
	Claims <u>1-73</u>	NO
Industrial Applicability (IA)	Claims <u>1-73</u>	YES
	Claims <u>NONE</u>	NO

2. CITATIONS AND EXPLANATIONS

Claims 1-38 and 48-73 lack an inventive step under PCT Article 33(3) as being obvious over US 6,190,556 B1 (UHLINGER) in view of US 4,802,982 A (LIEN).

Uhlinger'556 teaches membrane devices capable of salt rejection > 50% (col 8 lines 1-37: discusses monovalent and divalent salts). Even though MgSO₄ is not specifically taught, it would be obvious to one of ordinary skill in the art that MgSO₄ will have similar rejections. Uhlinger'556 teaches the membrane permeability (A value) for reverse osmosis and nanofiltration membranes as ranging from 10 to over 60 (converted from the data of col 2 lines 1-10). Uhlinger'556 does not teach the H and β values, thickness of permeate carrier or leaf length. Lien'982 teaches all these parameters and how to optimize the design based on these parameters (see columns 7-9, tables and working examples). It would be obvious to one of ordinary skill in the art at the time of invention to use the teachings of Lien'982 in the teaching of Uhlinger'556 to optimize the membrane device design for the desired performance. Even though none of these references teach specifics of leaf length and the number of leaves, leaf length and the number of leaves are variables that one of ordinary skill is capable of optimizing to provide the required membrane area for the desired permeate (product water) flow. The cross flow velocity of the feed is a process parameter, which has no structural relationship with the device claimed, and one of ordinary skill in the art is also capable of optimizing flow velocity from the feed quality, and the device specifics to minimize the pressure drop.

Claims 39-47 lack an inventive step under PCT Article 33(3) as being obvious over US 6,190,558 B1 (ROBBINS) in view of US 4,802,982 A (LIEN) and US 6,190,556 B1 (UHLINGER).

Robbins'556 teaches a tankless home reverse osmosis system comprising spiral wound element which provides at least 150 gallons/day of permeate flow (see abstract, column 4 lines 1-36 and col 6 lines 5-12). The A value is greater than 25 (calculated from pressure, flow and membrane area). This system can operate at < 30 psi driving pressure. Re the salt rejection, the system is expected to give > 90% NaCl rejection, even though the reference does not provide such details. Uhlinger teaches membrane elements that provide such kind of rejections (col 8 lines 1-15). Lien'982 teaches A and β values and how to optimize the device design. The dimensions of the membrane device depend on the permeate flow required, and one of ordinary skill in the art would be capable of designing it.

Claims 1-73 meet the criteria set out in PCT Article 33(4), and thus meet industrial applicability because the subject matter claimed can be made or used in water treatment industry.

----- NEW CITATIONS -----

US 6,190,556 B1 (UHLINGER) 20 February 2001 (20.02.2001)

WRITTEN OPINION

International Application No.
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Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

TIME LIMIT:

The time limit set for response to a Written Opinion may not be extended. 37 CFR 1.484(d). Any response received after the expiration of the time limit set in the Written Opinion will not be considered in preparing the International Preliminary Examination Report.